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(56) Documents cited
GB 2229414 A GB 2082126 A GB 1471528 A
FR 002609409 A

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(54) **Antenna arrangement**

(57) A vehicle-mounted antenna for the reception of satellite signals carrying positional and navigational information. An antenna 3, (5, Fig. 2) is supported by a light-emitting warning beacon 7. The antenna may be a spiral antenna 3 wound around the outer surface of the beacon housing 1. Alternatively, it may be a patch (5) mounted on the upper face (6) of the beacon housing 1. Such arrangements permit the antenna to be mounted high on the vehicle and prevent obstruction of the antenna field of view, particularly at low elevation angles, which may occur when there is a separate beacon mounted on the vehicle.

Fig.1

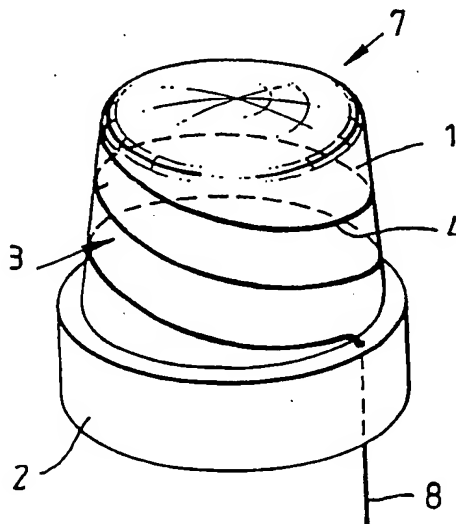


Fig. 1

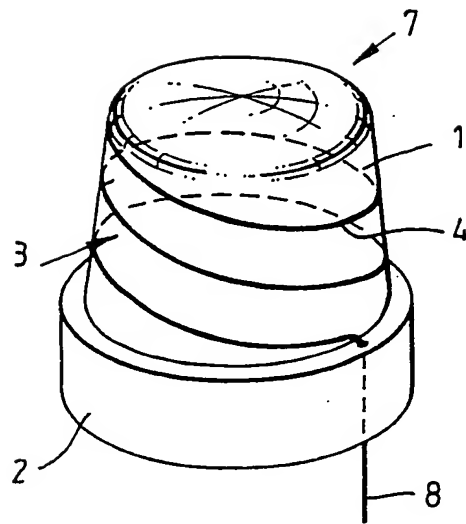
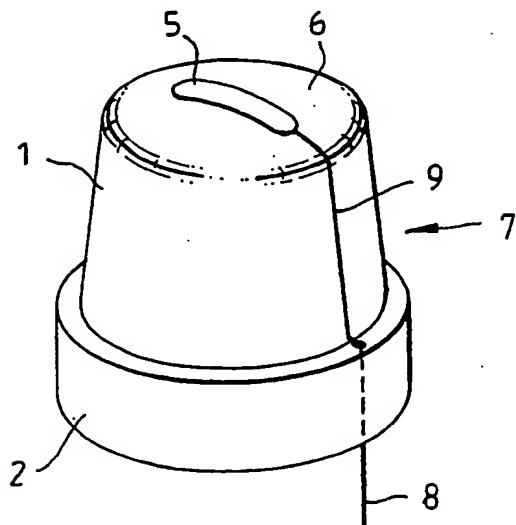


Fig. 2



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ANTENNA ARRANGEMENTS

This invention relates to antenna arrangements for use on vehicles.

There has been considerable growth in recent years in the use of satellite-based navigation and positioning systems, such as GPS (global positioning system). These systems enable a user to determine accurately his location on earth from very precise timing signals transmitted by satellites in known positions. Such systems are being increasingly adopted by fleet vehicle users, for example the emergency services. A vehicle-borne receiver enables position and navigation information to be conveniently obtained at any location where the minimum number of satellites can be "sighted" from the vehicle. Since the satellite signals to be received are of extremely low power, and in an urban environment line-of-sight obstructions may occur frequently, the receiving antenna should be mounted as high as practicable on the vehicle.

Vehicles used by emergency and other services, usually carry one or more warning beacons, commonly coloured flashing lights, mounted high on the vehicle roof so as to be visible to other vehicles and pedestrians. In the case of vehicles operating on airfields, such warning lights are also intended to be visible to low flying aircraft.

The presence on the vehicle roof of both one or more such beacons and a satellite receiving antenna gives rise to the possibility of mutual interference. The beacon is likely to obstruct the field of view of the antenna, particularly for satellites at low elevation angles, causing loss or at least attenuation of one of the satellite signals. This may affect the accuracy of the location calculation or even prevent it being made altogether. Further, the structure supporting the antenna may reduce the visibility of the beacon.

It is an object of the present invention to provide an antenna arrangement in which the aforementioned problems are alleviated.

According to the invention, there is provided an antenna arrangement comprising an antenna supported by a light-emitting warning beacon, the beacon being adapted to be mounted on a vehicle.

The beacon may include a housing of generally cylindrical shape, the antenna substantially conforming to the surface of the housing. The antenna may comprise a patch disposed on a closed end of the housing. Alternatively, the antenna may comprise a conductor wound in a helical coil.

The antenna may be protectively enclosed by the housing and it may be embedded in the housing.

Preferably, the antenna is adapted for reception of satellite signals.

The beacon may house an amplifier for the antenna.

Two antenna arrangements in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic illustration of an arrangement using a spiral antenna; and

Figure 2 is a diagrammatic illustration of an arrangement using a patch antenna.

Referring to the drawings, Figure 1 shows a light-emitting beacon 7 suitable for mounting on a vehicle roof. The beacon 7 comprises a support base 2 and a housing 1 of generally cylindrical, and typically somewhat conical, shape. The housing 1 is of

transparent material, suitably plastic and may be clear or coloured. The housing 1 encloses the light source of the beacon (not shown), which typically provides a flashing and/or rotating light beam. The above description is of a standard vehicle-mounted warning beacon.

In accordance with the present embodiment of the invention, the housing 1 supports a spiral antenna 3. The antenna 3 comprises a wire conductor 4 wound around the external 'cylindrical' surface of the housing 1 in a helical coil. For this purpose, the housing 1 may include a helical groove around its outer surface to accommodate the conductor 4. However, the antenna 3 may be supported on the housing 1 in many other ways. At the lower end of the antenna 3, the conductor 4 is conveniently fed through a hole in the base 2 to form a feed line 8 for the antenna. This feed line 8 can be easily routed into the vehicle in the same manner as the leads to the beacon. If required, a pre-amplifier for the antenna may be incorporated into the base 2.

In an alternative embodiment (not illustrated), the antenna 3 is wound inside the housing 1 so that the antenna is protectively enclosed. Again there may be a support groove formed on the inner surface of the housing to support the conductor 4. It will be appreciated also that the antenna 3 may be embedded in the housing 1. This would require the housing 1 and antenna 3 to be manufactured as a single item.

Figure 2 illustrates an alternative embodiment. Here the antenna comprises a patch 5 disposed on the closed end face 6 of the housing 1. If the end face 6 has a somewhat curved surface the patch 5 may be similarly curved. However, this is not essential, provided the patch 5 conforms substantially to the surface of face 6. A conductor 9 is connected to the patch 5 and may be routed through the base 2 as previously to provide the feed line 8. Again, the patch 5 may be disposed inside the housing 1, fixed to the inner surface of the end face 6. Alternatively, the patch 5 may be embedded in the housing. Again, a pre-amplifier for the antenna may be incorporated into the base 2.

The invention thus comprises an antenna supported by a vehicle-mounted warning beacon. Preferably, the antenna conforms substantially to the beacon surface. Supporting the antenna by means of the beacon housing avoids the aforementioned problem of mutual interference between the beacon and the antenna. The antenna is located at a high point on the vehicle and its field of view is not obstructed by the beacon. Further, the antenna does not obstruct significantly light emitted from the beacon.

While these arrangements are particularly intended for the reception of satellite signals carrying positional information, it will be appreciated that the invention is not so limited. The antenna may therefore be adapted for terrestrial communication, and it may also be used for transmission.

CLAIMS

1. An antenna arrangement comprising an antenna supported by a light-emitting warning beacon, the beacon being adapted to be mounted on a vehicle.
2. An antenna arrangement according to Claim 1, wherein said beacon includes a housing of generally cylindrical shape, said antenna substantially conforming to the surface of said housing.
3. An antenna arrangement according to Claim 2, wherein said antenna comprises a patch disposed on a closed end of said housing.
4. An antenna arrangement according to Claim 2, wherein said antenna comprises a conductor wound in a helical coil.
5. An antenna arrangement according to Claim 3 or Claim 4, wherein said antenna is protectively enclosed by said housing.
6. An antenna arrangement according to Claim 5, wherein said antenna is embedded in said housing.
7. An antenna arrangement according to any one of the preceding claims, wherein said antenna is adapted for reception of satellite signals.
8. An antenna arrangement according to any one of the preceding claims, wherein said beacon houses an amplifier for said antenna.
9. An antenna arrangement substantially as hereinbefore described, with reference to the accompanying drawings.

Amendments to the claims have been filed as follows

1. An antenna arrangement comprising an antenna supported by a light-emitting warning beacon, the beacon being adapted to be mounted on a vehicle, wherein the beacon includes a light-emitting housing, the antenna substantially conforming to the surface of the housing.
2. An antenna arrangement according to Claim 1, wherein said antenna comprises a patch disposed on a closed end of said housing.
3. An antenna arrangement according to Claim 1, wherein said antenna comprises a conductor wound in a helical coil.
4. An antenna arrangement according to Claim 2 or Claim 3, wherein said antenna is protectively enclosed by said housing.
5. An antenna arrangement according to Claim 4, wherein said antenna is embedded in said housing.
6. An antenna arrangement according to any one of the preceding claims, wherein said antenna is adapted for reception of satellite signals.
7. An antenna arrangement according to any one of the preceding claims, wherein said beacon houses an amplifier for said antenna.
8. An antenna arrangement substantially as hereinbefore described, with reference to the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
section 17 (The Search Report)

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Relevant Technical fields

(i) UK Cl (Edition K) H1Q (QKE, QKN, QDJ, QKA)

(ii) Int Cl (Edition 5) H01Q

Databases (see over)

(i) UK Patent Office

(ii) Online Databases: WPI

Search Examiner

B J EDE

Date of Search

4 SEPTEMBER 1991

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2229414 A (WINER) - whole document relevant	1
X	GB 2082126 A (SUBMEX) - see especially 24, 26 and 27	1
X	GB 1471528 (PAINS-WESSEX) - see 40, 7, Figure 1 and 46 Figures 2 and 3 and 63, Figure 9	1
X	FR 2609409 A (LESTERPS) - see especially 2 and 5, Figures 1 and 2	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).